Athletes and Low Back Pain

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Ortho Montana
Magic City Sports Medicine Conference
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Disclosures

Nothing to Disclose

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Objectives

- Common etiologies of low back pain in athletes
- Lumbar Radiculopathy
  - Natural History
  - Conservative
  - ESI
  - Surgical

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BJSM: Incidence, Prevalence, and risk factors for low back pain in adolescent athletes: a systematic review and meta-analysis. 2022

- 80 studies, adolescents aged 10-19 years
- 36% 12 month incidence
- 42% 12 month prevalence

- Risk factors for LBP:
  - Sport participation, volume/intensity, concurrent lower extr pain, overweight/high BMI, older adolescent age, female, family hx of LBP

Wall J, Meehan, WP, Trompeter K, et al Incidence, prevalence and risk factors for low back pain in adolescent athletes: a systematic review and meta-analysis British Journal of Sports Medicine Published Online First: 23 September 2022. doi: 10.1136/bjsports-2021-104749

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DePalma et al

- Retrospective chart review at an academic spine center
- Patients, 170 cases from 156 patients who underwent diagnostic procedures were included.
- Interventions. Discography, dual diagnostic facet joint blocks, intra-articular sacroiliac joint injections, anesthetic injections of painful areas.
- 378 cases from 358 subjects, 208 cases from 202 patients who did not undergo procedures
- 202 patients with unknown definitive cause of pain, improved with further conservative treatments; muscle strain may be included in that number of patients

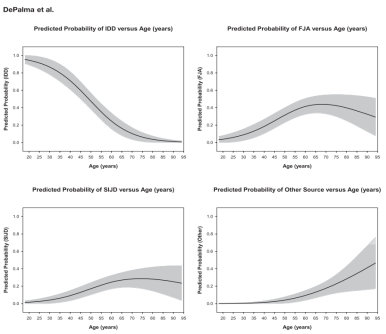

Figure 4 Predicted probabilities and 95% confidence intervals for internal disc disruption (IDD), facet joint pain (FJP), sacroiliac joint pain (SIJP), and other sources of low back pain (LBP) as a function of age.

DePalma MJ, Ketchum JM, Saullo T. What is the source of chronic low back pain and does age play a role? Pain Med. 2011 Feb;12(2):224-33. doi: 10.1111/j.1526-4637.2010.01045.x. Epub 2011 Jan 25. PMID: 21266006.

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Arthrosc Sports Med Rehabil. 2021 Apr; 3(2): e515–e520.
Published online 2021 Jan 30. doi: 10.1016/j.asmr.2020.12.001
PMCID: PMC8129455
PMID: 34027463

Sex- and Sports-Specific Epidemiology of Traumatic Lumbar Spine Injuries Sustained During Sporting Activities: Male Snowboarders and Female Horseback Riders at Greatest Risk

Ryan Cheng, B.A.,[a] Joseph B. Kahan, M.D., M.P.H.,[a] Don Li, Ph.D.,[a,b] Christopher A. Schneble, M.D.,[a] and Elizabeth C. Gardner, M.D.[a,*]

- Retrospective Review
- First study to look at all athletes, not just college or professional athlete databases.
- Male patients, most injuries were experienced as a result of snowboarding (13%), weightlifting (10%), and football (6%)
- Female patients, Horseback riding (27%), skiing (5%), and roller skating (4%)

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Low Back Pain in Adolescents: A 1-Year Analysis of Eventual Diagnoses

- A national insurance database (PearlDiver Patient Records Database) was queried for ICD-9 codes to identify patients aged 10 to 19 years with back pain from 2007 to 2010.
- Patients were tracked for imaging obtained, and eventual development of subsequent associated spinal pathology diagnoses
- 80% no identifiable diagnosis within 1 year.
- most common associated subsequent diagnoses were lumbar strain/spasm (8.9%), scoliosis (4.7%), lumbar degenerative disk disease (1.7%), and lumbar disk herniation (1.3%).
- The rates of all other diagnoses including spondylolysis, spondylolisthesis, infection, tumor, and fracture had <1% association with LBP.

Yang S, Werner BC, Singla A, Abel MF. Low Back Pain in Adolescents: A 1-Year Analysis of Eventual Diagnoses. J Pediatr Orthop. 2017 Jul/Aug;37(5):344-347. doi: 10.1097/BPO.0000000000000653. PMID: 26368854.

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Back Pain etiology

- There are a number of studies with prevalence data on low back pain etiology in athletes.
- Unfortunately we do not have complete prevalence data with accurate diagnostic tests to achieve accurate prevalence data
- Muscle strain is reported as the most common etiology by far
- Lumbar disc hernation is also fairly common
- Spondylolysis/ pars fractures is also common
- Back Pain etiology is very sport specific with extension and torsional activities (football, gymnastics) contributing most to spondylolysis and disc disruption
- Muscle strain should be a diagnosis of exclusion ruling out other causes of back pain first, using imaging and advanced imaging to assist in diagnosis prior to treatment and return to sport

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Lumbar Radiculopathy

- **Natural History**
- Conservative treatment
- Epidural Steroid Injections
- Surgery

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Natural History of Disc Herniation

- The natural history of disc herniation is **resolution**.
- Saal (1990): 50% of conservatively treated disc herniations causing radicular pain decrease in size by 75% on follow up imaging (25months)
- Bush (1992): 76% of 165 patients with disc extrusions or disc sequestrations showed complete or partial resolution on follow up.
  - Only 26% of patients with annular bulges showed resolution.

Saal JA, Saal JS, Herzog RJ. The natural history of lumbar intervertebral disc extrusions treated nonoperatively. Spine. 1990 Jul;15(7):683-6.
Bush K, et al. The natural history of sciatica associated with disc pathology. A prospective study with clinical and independent radiologic follow-up. Spine. 1992 Oct;17(10):1205-12

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Lumbar Radiculopathy

- Natural History
- **Conservative Treatment**
- Epidural Steroid Injections
- Surgery

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LR - Medications

- NSAIDs no better than placebo.
- Systemic steroids - May give brief modest improvement in function +/- pain.
- Gabapentin – TCAs – minimal literature to support use.
- "Muscle Relaxants" – no evidence to support use

Weber H, Holme I, Amlie E. The natural course of acute sciatica with nerve root symptoms in a double-blind placebo-controlled trial evaluating the effect of piroxicam. *Spine (Phila Pa 1976)*. 1993;18(11):1433-1438.

Goldberg H, Firtch W, Tyburski M, et al. Oral steroids for acute radiculopathy due to a herniated lumbar disk: a randomized clinical trial. *JAMA*. 2015;313(19):1915-1923. Chou R et al. Drugs for relief of pain in patients with sciatica: systematic review and meta-analysis BMJ 2012;344:e497

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LR - Physical Therapy / Manual Therapy

- According to the North American Spine Society (NASS): "There is an insufficient evidence to make a recommendation for or against the use of physical therapy/structured exercise programs as stand-alone treatments for lumbar disc herniation with radiculopathy."
  - Limited course of structured exercise is an option for patients with mild-to-moderate symptoms from lumbar disc herniation with radiculopathy"
- Lumbar Stabilizing exercises may improve ADL performance
- No strong evidence for traction, manual therapy.

A.H. Bakhtiary, Z. Safavi-Farokhi, A. Rezasoltani **Lumbar stabilizing exercises improve activities of daily living in patients with lumbar disc herniation** J Back Musculoskelet Rehabil, 18 (2005), pp. 55-60

A. Thackeray, J.M. Fritz, G.P. Brennan, *et al* **A pilot study examining the effectiveness of physical therapy as an adjunct to selective nerve root block in the treatment of lumbar radicular pain from disk herniation: a randomized controlled trial** Phys Ther, 90 (2010), pp. 1717-1729

Kriener, MD. **An evidence-based clinical guideline for the diagnosis and treatment of lumbar disc herniation with radiculopathy**. Spine. , 14 (2014). PP 180-191

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Classification Systems

American Physical Therapy Association Clinical Practice Guidelines

Patho-anatomical Treatment Approach

⬇

Classification System

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Exercise | Manual and Other Directed Therapies | Classification Systems | Patient Education

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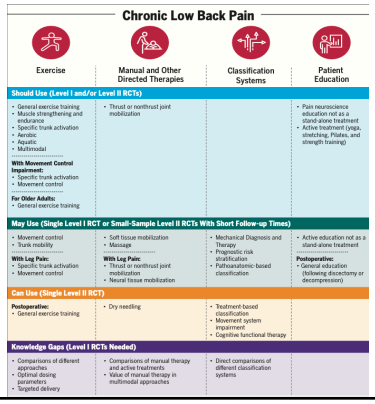

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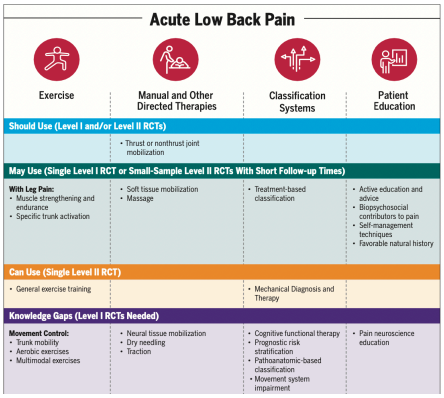

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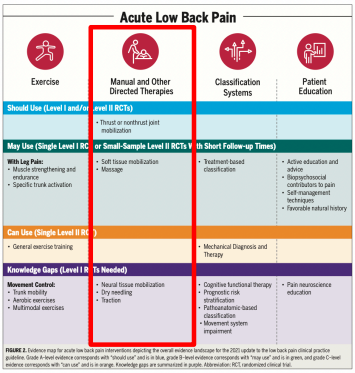

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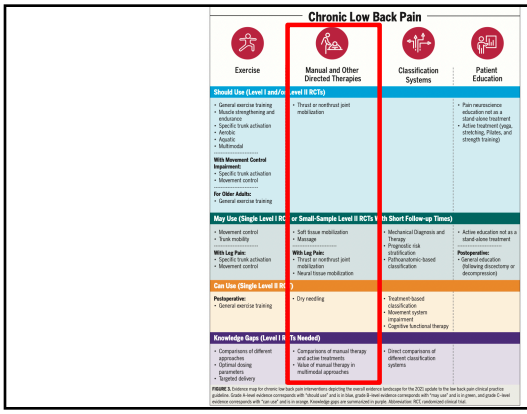

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Early Physical Therapy vs Usual Care in Patients With Recent-Onset Low Back Pain
A Randomized Clinical Trial

Julie M. Fritz, PhD, PT; John S. Magel, PhD, PT; Molly McFadden, MS; Carl Asche, PhD; Anne Thackeray, PhD, PT; Whitney Meier, DPT; Gerard Brennan, PhD, PT

- Evaluate whether early PT is more effective than usual care in improving disability for patients with LBP
- 220 pts, ODI <20, Sx duration <16 days, no sxs distal to knee
- The group receiving mobilization with exercise and education had greater improvement in disability (ODI) after 4 weeks and 3 months

eAppendix 1. Early Physical Therapy Protocol

INTERVENTION	Baseline assessment	Session 1 (within 72 hours)	Session 2 (2-3 days later)	Session 3 (1 week later)	Session 4 (1 week later)
Advice and Education	X	As needed	As needed	As needed	As needed
Spinal Manipulation		X	X		
Spinal Range of Motion Exercise		X	X		
Spinal Strengthening Exercise			X	X	X

2015

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Thrust and Non-Thrust Joint Mobilization

- A continuum of skilled passive movement applied at varying speeds and amplitudes within or at the end range of motion of a joint. Thrust procedures are those provided with low amplitude and high velocity

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Soft Tissue Mobilization & Massage

Soft Tissue Mobilization

- Skilled passive movement of soft tissue, including fascia, muscles, and ligaments, to reduce pain or improve range of motion. Techniques include myofascial release, trigger point therapy, strain/counterstrain, etc.

Massage

- A general term referring to techniques using the hands to promote relaxation of underlying muscles

B Physical therapists may use massage or soft tissue mobilization for short-term pain relief in patients with acute LBP.

B Physical therapists may use soft tissue mobilization or massage in conjunction with other treatments to reduce pain and disability in the short term for patients with chronic LBP.

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Dry Needling

- An intervention that uses a thin filiform needle to penetrate the skin and stimulate underlying myofascial trigger points and muscular and connective tissues for the management of pain and movement impairments

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scientific reports

OPEN **The effectiveness of dry needling in patients with chronic low back pain: a prospective, randomized, single-blinded study**

Joanna Rajfur[1], Katarzyna Rajfur[2], Łukasz Kosowski[3], Karolina Walewicz[1,2], Robert Dymarek[4,5], Kuba Ptaszkowski[4] & Jakub Taradaj[6]

- Assess the effectiveness of DN for reducing pain intensity and improving functional efficiency in patients with chronic LBP

- 40 pts
- Group 1: DN + Exercise
- Group 2: Sham DN + Exercise
- 2x per week x5 weeks

2022

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scientific reports

OPEN **The effectiveness of dry needling in patients with chronic low back pain: a prospective, randomized, single-blinded study**

Joanna Rajfur[1], Katarzyna Rajfur[2], Łukasz Kosowski[3], Karolina Walewicz[1,2], Robert Dymarek[4,5], Kuba Ptaszkowski[4] & Jakub Taradaj[6]

DN Group
- Improved pain (VAS) ($p < 0.001$)
- Higher pain reduction compared to sham ($p < 0.001$)
- Improved ODI ($p < 0.001$)
- Improved ROM (Schober test) ($p < 0.001$)

Sham Group
- Improved pain (VAS) ($p < 0.001$)

2022

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C Physical therapists can consider the use of dry needling in conjunction with other treatments to reduce pain and disability in the short term in patients with chronic LBP.

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Neural Tissue Mobilization

- Manual therapy techniques intended to enhance the dynamic balance between the relative movement of neural tissues and surrounding mechanical interfaces

B Physical therapists may use neural mobilization in conjunction with other treatments for short-term improvements in pain and disability in patients with chronic LBP with leg pain.

Mechanical Traction

- An intervention that uses manually or mechanically applied forces with the intention of stretching and distracting the spine

D Physical therapists should not use mechanical traction for patients with chronic LBP with leg pain, based on the lack of benefit when added to other interventions.

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Lumbar Radiculopathy

- Natural History
- Conservative Treatment
- **Epidural Steroid Injections**
- Surgery

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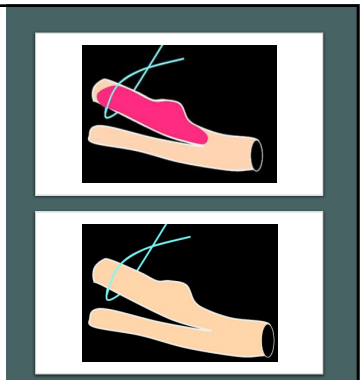
Etiology of Pain in Radiculopathy

- Stretching a normal root does not cause pain.
- Stretching causes pain only from a previously injured (compressed), inflamed nerve root.
- Typically both a compressive and inflammatory component to the pain



Smyth MN, Wright V. Sciatica and the intervertebral disc. An experimental study. J Bone and Joint Surg 1959; 40A:1401-1418.

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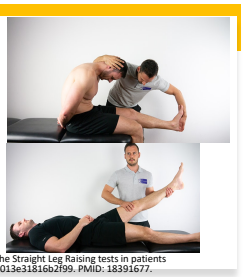
Slump and straight leg raise tests

- 75 patients in outpatient Neurosurg teaching dept referred/self-referred with low back, leg, or low back/leg symptoms
- 38 with disc herniations on MRI

Slump test:
- Sens 0.84
- Spec 0.83

Striaght Leg Raise:
- Sens 0.52
- Spec 0.89



- Majlesi J, Togay H, Unalan H, Toprak S. The sensitivity and specificity of the Slump and the Straight Leg Raising tests in patients with lumbar disc herniation. J Clin Rheumatol. 2008 Apr;14(2):87-91. doi: 10.1097/RHU.0b013e31816b2f99. PMID: 18391677.

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Epidural Steroid Injections - Rationale

- Radicular pain typically occurs due to both neural compression and inflammation.
- The natural history of disc herniation is resolution.
- If the inflammatory response can be blunted by the precise delivery of an anti-inflammatory medication to the disc / neural interface, the patient's pain may be relieved until the favorable natural history prevails.

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Determining the Level - Imaging

- Meta analysis of 35 studies reporting a total of 3110 lumbar spine MRI findings in asymptomatic individuals
- "Abnormal" findings are very common.

Age-specific prevalence estimates of degenerative spine imaging findings in asymptomatic patients[a]

	Age (yr)						
Imaging Finding	**20**	**30**	**40**	**50**	**60**	**70**	**80**
Disk degeneration	37%	52%	68%	80%	88%	93%	96%
Disk signal loss	17%	33%	54%	73%	86%	94%	97%
Disk height loss	24%	34%	45%	56%	67%	76%	84%
Disk bulge	30%	40%	50%	60%	69%	77%	84%
Disk protrusion	29%	31%	33%	36%	38%	40%	43%
Annular fissure	19%	20%	22%	23%	25%	27%	29%
Facet degeneration	4%	9%	18%	32%	50%	69%	83%
Spondylolisthesis	3%	5%	8%	14%	23%	35%	50%

Brinjikji W, Luetmer PH, Comstock B, et al. Systematic literature review of imaging features of spinal degeneration in asymptomatic populations. *AJNR Am J Neuroradiol*. 2015;36(4):811-816. doi:10.3174/ajnr.A4173

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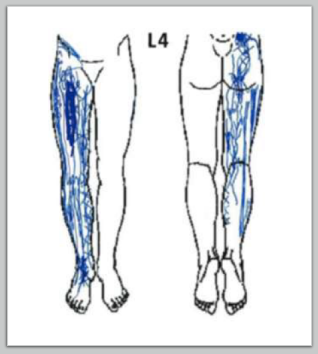
Determining the Level - Exam

- 87 patients had level-specific induced pain and were asked to draw pain referral patterns.
- Classic dermatomal mapping was not accurate in most cases.



Furman MB, Johnson SC. Induced lumbosacral radicular symptom referral patterns: a descriptive study. *Spine J*. 2019;19(1):163-170. doi:10.1016/j.spinee.2018.05.029

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Determining the Level

- Find the level where both imaging and exam can most likely agree.

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Lumbar ESI-Evidence

- Ghahreman (2010):
- 150 patients randomized to:
  - Transforaminal injection of steroid
  - Transforaminal injection of bupivacaine
  - Transforaminal injection of normal saline
  - Intramuscular injection of steroid
  - Intramuscular injection of normal saline

Outcome measure: Proportion of patients who achieved complete relief of pain, or at least 50% relief, at 1 month after treatment

Ghahreman, A, Ferch, R, Bogduk N. The efficacy of transforaminal injection of steroids for the treatment of lumbar radicular pain. Pain Med 2010; 11:1149-1168.

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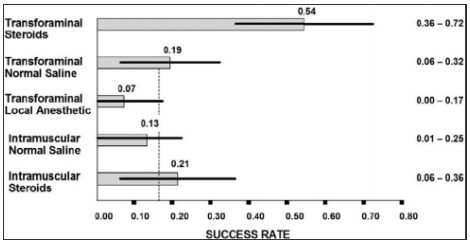

Ghahreman, A, Ferch, R, Bogduk N. The efficacy of transforaminal injection of steroids for the treatment of lumbar radicular pain. Pain Med 2010; 11:1149-1168.

Lumbar ESI-Evidence

Proportion of patients who achieved complete relief of pain, or at least 50% relief, at 1 month after treatment

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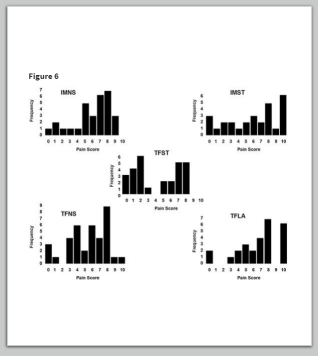
Lumbar ESI - Evidence

- At 1 month (VAS): 54% (95% CI 36-72%) of patients obtained at least 50% relief.
- At 12 months (VAS): 11% of patients still had at least 50% relief of pain, and a further 14% still had complete relief. (not significantly different from other groups)

Ghahreman, A, Ferch, R, Bogduk N. The efficacy of transforaminal injection of steroids for the treatment of lumbar radicular pain. Pain Med 2010; 11:1149-1168.



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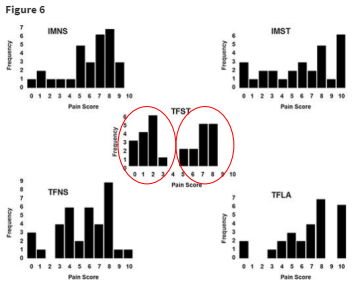
Lumbar ESI - Evidence

Ghahreman (2011):



Ghahreman A, Bogduk N. Predictors of a favorable response to transforaminal injection of steroids in patients with lumbar radicular pain due to disc herniation. Pain Med 2011; 12: 871–879

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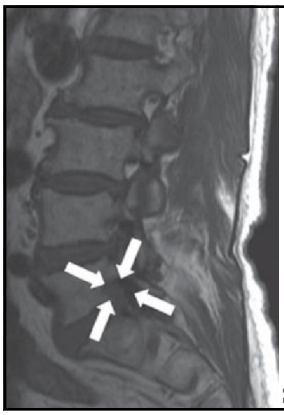

Lumbar ESI - Efficacy

Ghahreman (2011):

- Took TF ESI Sample and looked for difference between responders and non-responders.
  - No difference noted with duration of symptoms, neurologic exam findings, location of herniation, degenerative changes at that level.
  - Significant difference noted in neural compression:
    - Low grade compression: 75% success rate
    - High grade compression: 26% success rate

Ghahreman A, Bogduk N. Predictors of a favorable response to transforaminal injection of steroids in patients with lumbar radicular pain due to disc herniation. Pain Med 2011; 12: 871–879

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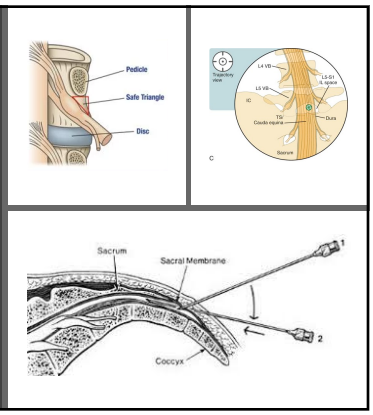
Lumbar ESI - Approach

- There may be increased efficacy observed with transforaminal injection vs. interlaminar and caudal approaches.
- No difference between interlaminar and caudal.

ee JH, Shin KH, Park SJ, et al. Comparison of Clinical Efficacy Between Transforaminal and Interlaminar Epidural Injections in Lumbosacral Disc Herniation: A Systematic Review and Meta-Analysis. *Pain Physician*. 2018;21(5):433-48.

ee JH, Shin KH, Bahk SJ, et al. Comparison of clinical efficacy of transforaminal and caudal epidural steroid injection in lumbar and lumbosacral disc herniation: A systematic review and meta-analysis. *Spine J*. 018;18(12):2343-2353. doi:10.1016/j.spinee.2018.06.720

Iadas I, Sakic K, Fingler M, Kapural L. Efficacy of interlaminar vs transforaminal epidural steroid injection for the reatment of chronic unilateral radicular pain: Prospective, randomized study. Pain Med 2021;12(9):1316–21.



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Lumbar ESI – Surgical Avoidance

- At one year, avoidance of surgery has been reported to vary between 56% and 90%.
  - At two years, 67% (95% CI = 47–87%) and 68% (95% CI = 57–79%)

Smith CC, McCormick ZL Mattie R MacVicar J Et al. The Effectiveness of Lumbar Transforaminal Injection of Steroid for the Treatment of Radicular Pain: A Comprehensive Review of the Published Data, *Pain Medicine*. 2020 21(3), 472–487, https://doi.org/10.1093/pm/pnz160

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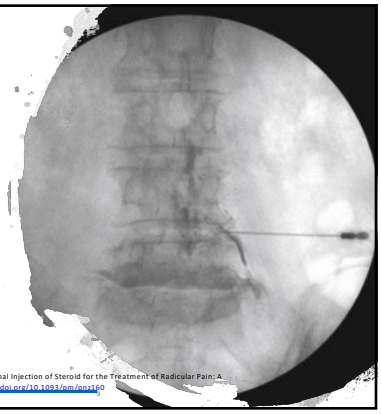
Lumbar ESI - Efficacy

- For patients with lumbar radiculopathy from a disc herniation, at least 50% reduction in pain in:
  - 1 month: 63% (58-68%)
  - 3 months: 74% (68-80%)
  - 6 months: 64% (59-69%)
  - 12 months: 64% (45-73%)
- Need for more controlled studies.



Smith CC, McCormick ZL Mattie R MacVicar J Et al. The Effectiveness of Lumbar Transforaminal Injection of Steroid for the Treatment of Radicular Pain: A Comprehensive Review of the Published Data, *Pain Medicine*. 2020 21(3), 472–487, https://doi.org/10.1093/pm/pnz160

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Epidural corticosteroid injections for sciatica

An Abridged Cochrane Systematic Review and Meta-Analysis

Oliveira, Crystian B.[a]; Maher, Christopher G.[b]; Ferreira, Manuela L.[c]; Hancock, Mark J.[d]; Oliveira, Vinicius Cunha[e]; McLachlan, Andrew J.[f]; Koes, Bart W.[g,h]; Ferreira, Paulo H.[i]; Cohen, Steven P.[j]; Pinto, Rafael Z.[k] **Author Information**

SPINE: September 01, 2020 - Volume Publish Ahead of Print - Issue -

Conclusion.

A review of 25 placebo-controlled trials provides moderate quality evidence that epidural corticosteroid injections are effective, though the effects are small and short term. There is uncertainty on safety due to very low quality evidence.

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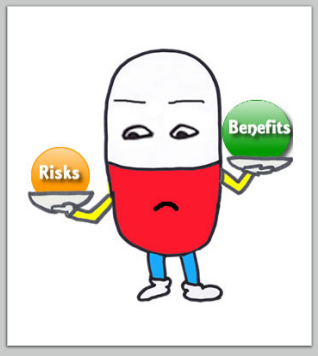
Lumbar ESI – Adverse Events

- 16,638 injections
  - (14,956 TFESI, 1,682 ILESI)
- Dural Puncture in 0.06%
  - More commonly in IL
- No permanent neurologic injury
- Other major reported risks include: epidural hematoma
  - Did not stop Plavix
- Spinal cord infarction (14 reported cases)
  - All used particulate steroid other than one.



El-Yahchouchi CA, Plastaras CT, Maus TP, et al. . Adverse event rates associated with transforaminal and interlaminar epidural steroid injections: A multi-institutional study. *Pain Med* 2016;17(2):239–49.

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Lumbar ESI– Adverse Events

- 1,295 patients with 2025 TFESI
- Immediate and delayed adverse events recorded.
- Most common immediate was vasovagal (5%).
- Most common delayed is exacerbation of pain (5%)
- Trainee involvement did not impact complication rate.
- NO permanent adverse events.

Immediate adverse events after TFESI

Immediate adverse events	Immediate adverse event n (%)
Number of procedures with data available	2,025
Total adverse events	186 (9.2)
Vasovagal episode	85 (5.0)
Vasovagal episode—injection completed	59 (2.9)
Intravascular flow that changed or interrupted the procedure	34 (1.7)
Vasovagal episode—Injection discontinued	26 (2.1)
Increased pain that changed or interrupted the procedure	17 (0.8)
Alternate injection approach or location required—injection completed	17 (0.8)
Intradiscal flow pattern	7 (0.4)
Dizziness/light-headedness without bradycardia or hypotension	6 (0.3)
Patient movement/positioning that changed or interrupted procedure	5 (0.3)
Temporary motor-spinal block	4 (0.2)
Dural puncture	3 (0.2)
Nausea without bradycardia or hypotension	3 (0.2)
Alternate injection approach or location required—injection not completed	2 (0.1)
Temporary sensory-spinal block	2 (0.1)
Steroid-clogged needle	2 (0.1)
Sensation of facial burning	1 (<0.1)
Sensation of throat fullness	1 (<0.1)
Symptomatic hypertension	1 (<0.1)

TFESI, transforaminal epidural steroid injection.

Delayed adverse events	Delayed adverse event n (%) reported
Number of procedures with data available	1,523
Total adverse events	305 (20.0)
Pain exacerbation	76 (5.0)
Injection site soreness	59 (3.9)
Headache—transient	58 (3.8)
Facial flushing/sweating	28 (1.8)
Insomnia	25 (1.6)
Injection site swelling	13 (0.9)
Fever	13 (0.9)
Nausea/vomiting	10 (0.7)
Rash	9 (0.6)
Sensation of pressure at injection site	7 (0.5)
Mood fluctuation/anxiety/depression	6 (0.4)
Subjective weakness	6 (0.4)
Cramping	5 (0.3)
Numbness	5 (0.3)
Elevated blood sugar	5 (0.3)
Hospitalization/emergency room visit	5 (0.3)
Hypertension	4 (0.3)
Subjective shakiness	4 (0.3)
Hiccups	4 (0.3)
Fatigue	3 (0.2)
Spasms	3 (0.2)
Dizziness/light-headedness	3 (0.2)
Chills	2 (0.1)
Diarrhea	2 (0.1)
Flu-like symptoms	2 (0.1)
Sneezing	1 (<0.1)
Vasovagal episode	1 (<0.1)
Cold sensation in hands and feet	1 (<0.1)
Bowel incontinence	1 (<0.1)
Headache—severe	1 (<0.1)

Plastaras, C, McCormick ZL, Garvan C, et al. Adverse events associated with fluoroscopically guided lumbosacral transforaminal epidural steroid injections. *Spine.* 2015. 15(10) 2157-2165

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Lumbar Radiculopathy

- Natural History
- Conservative Treatment
- Epidural Steroid Injections
- **Surgery**

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Lumbar Radiculopathy - Surgery

- Peul (2007)
  - 283 patients randomly assigned to early surgery or conservative treatment.
  - Relief of leg pain was faster for patients assigned to early surgery.
  - In both groups, however, the probability of perceived recovery after 1 year of follow-up was 95%.
  - A lot of cross-over

- Peul WC, Houwelingen HC, Hout WB, Brand R, Eekhof JA, Tans JT, Thomeer RT, Koes BW. Surgery versus prolonged conservative treatment for sciatica. N Engl J Med. 2007;356:2245–2256.

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Lumbar Radiculopathy - Surgery

- SPORT trial
  - Randomized to operative (n=245) vs conservative(n=256) groups.
  - Patients in both the surgery and non-operative groups improved substantially over a 2-year period, with no difference in outcomes after 3 months.
  - Large cross-over

Weinstein JN, Lurie JD, Tosteson TD, et al. Surgical vs Nonoperative Treatment for Lumbar Disk Herniation The Spine Patient Outcomes Research Trial (SPORT): A Randomized Trial . *Spine (Phila Pa 1976).* 2008;33(25):2789-2800. doi:10.1097/BRS.0b013e31818ed8f4

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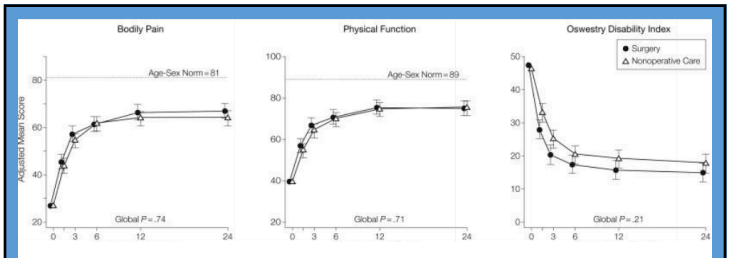

SPORT Trial – 2-year outcomes

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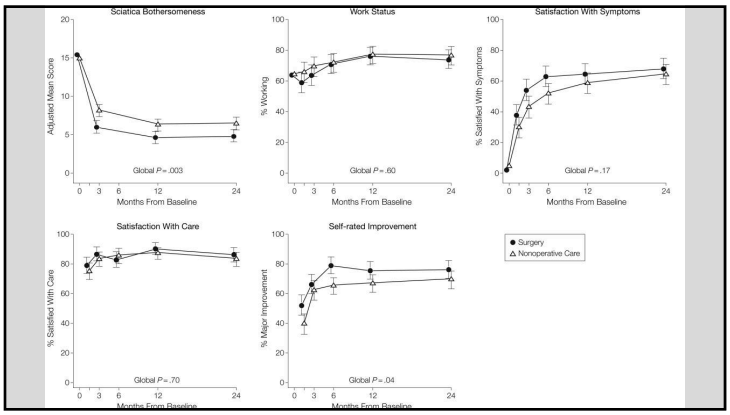

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Lumbar Radiculopathy - Surgery

- SPORT trial, 4 year follow up
  - Operative (n=528) vs conservative(n=743) groups.
  - Self-selected arm and randomized arm
  - Surgical group greatest difference in improvement at 3 months, but showed superior outcomes compared to conservative management
  - No difference in return to work.
  - 10% incidence of repeat surgery at 4 years.

- Weinstein JN, Lurie JD, Tosteson TD, et al. Surgical versus nonoperative treatment for lumbar disc herniation: four-year results for the Spine Patient Outcomes Research Trial (SPORT). *Spine (Phila Pa 1976)*. 2008;33(25):2789-2800. doi:10.1097/BRS.0b013e31818ed8f4

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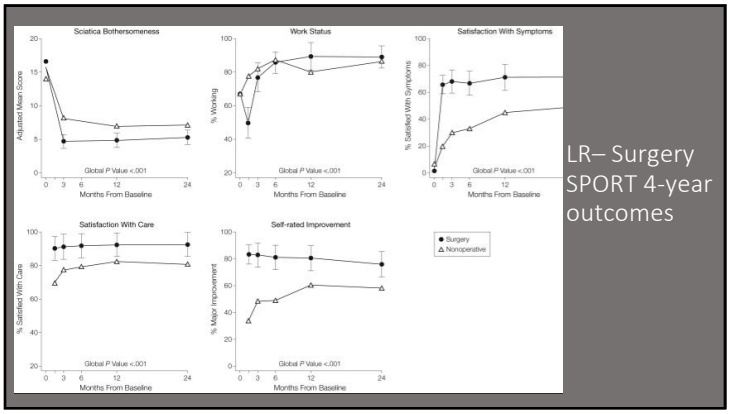

LR– Surgery SPORT 4-year outcomes

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LR - Surgery

- Practically when to refer:
  - Progressive motor weakness
  - Red Flag symptoms
  - Intractable pain after conservative treatment.
- Who does best with surgery:
  - Age <40, symptoms less than 3 months may have better outcomes after endoscopic microdiscectomy.

Y. Ahn, S.H. Lee, J.H. Lee, *et al.* **Transforaminal percutaneous endoscopic lumbar discectomy for upper lumbar disc herniation: clinical outcome, prognostic factors, and technical consideration** Acta Neurochir (Wien), 151 (2009), pp. 199-206

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References

- A.H. Bakhtiary, Z. Safavi-Farokhi, A. Rezaeitalani Lumbar stabilizing exercises improve activities of daily living in patients with lumbar disc herniation *J Back Musculoskelet Rehabil*, 18 (2005), pp. 55-60
- Choi SJ. Et al. The Use of Magnetic Resonance Imaging to Predict the Clinical Outcome of Non-Surgical Treatment for Lumbar Intervertebral Disc Herniation Korean J Radiol. 2007 Mar-Apr;8(2):156-163
- Ghahreman A, Bogduk N. Predictors of a favorable response to transforaminal injection of steroids in patients with lumbar radicular pain due to disc herniation. Pain Med 2011; 12: 871–879
- Vad VB, Bhat AL, Lutz GE, Cammisa F. Transforaminal epidural steroid injections in lumbosacral radiculopathy: a prospective randomized study. Spine 2002;27:11–16.
- Simotas AC. Nonoperative treatment for lumbar spinal stenosis. Clin Orthop Relat Res 2001;384:153–161.
- Yang S, Werner BC, Singla A, Abel MF. Low Back Pain in Adolescents: A 1-Year Analysis of Eventual Diagnoses. J Pediatr Orthop. 2017 Jul/Aug;37(5):344-347.
- Rivest C, Katz N, Ferrante FM, Jamison RN. Effects of epidural steroid injection on pain due to lumbar spinal stenosis or herniated disks: a prospective study. Arthritis Care Res 1998;11:291–297
- A. Thackeray, J.M. Fritz, G.P. Brennan, et al.A pilot study examining the effectiveness of physical therapy as an adjunct to selective nerve root block in the treatment of lumbar radicular pain from disk herniation: a randomized controlled trial Phys Ther, 90 (2010), pp. 1717-1729
- Weber H, Holme I, Amlie E. The natural course of acute sciatica with nerve root symptoms in a double-blind placebo-controlled trial evaluating the effect of piroxicam. *Spine (Phila Pa 1976)*. 1993;18(11):1433-1438.
- Goldberg H, Firtch W., Tyburski M, et al. Oral steroids for acute radiculopathy due to a herniated lumbar disk: a randomized clinical trial. JAMA. 2015;313(19):1915-1923. doi:10.1001/jama.2015.4468
- Pinto RF et al. Drugs for relief of pain in patients with sciatica: systematic review and meta-analysis BMJ 2012;344:e497
- Clark C Smith, MD, MPH, Zachary L McCormick, MD, Ryan Mattie, MD, John MacVicar, MBChB, MPainMed, Belinda Duszynski, BS, Milan P Stojanovic, MD, The Effectiveness of Lumbar Transforaminal Injection of Steroid for the Treatment of Radicular Pain: A Comprehensive Review of the Published Data, Pain Medicine, Volume 21, Issue 3, March 2020, Pages 472–487
- Smyth MN, Wright V. Sciatica and the intervertebral disc. An experimental study. J Bone and Joint Surg 1959; 40A:1401-1418.
- Singh, J. R., Cardoso, E., & Christolas, G. C. (2017). The Clinical Efficacy for Two-Level Transforaminal Epidural Steroid Injections. PM&R, 9(4), 377-382.
- Kriener, MD. An evidence-based clinical guideline for the diagnosis and treatment of lumbar disc herniation with radiculopathy. Spine ., 14 (2014). PP 180-191
- Saal JA, Saal JS, Herzog RJ. The natural history of lumbar intervertebral disc extrusions treated nonoperatively. Spine. 1990 Jul;15(7):683-6.
- Cheng B, Kahan JB, Li D, Schneible CA, Gardner EC. Sex- and Sports-Specific Epidemiology of Traumatic Lumbar Spine Injuries Sustained During Sporting Activities: Male Snowboarders and Female Horseback Riders at Greatest Risk. Orthosc Sports Med Rehabil. 2021 Jan 30;2(2):e517-e520.
- Bush K, et al. The natural history of sciatica associated with disc pathology. A prospective study with clinical and independent radiologic follow-up. Spine. 1992 Oct;17(10):1205-12
- Karppinen J, et al. Periradicular infiltration for sciatica. A randomized controlled trial. Spine 2001;26:1059-1067.»

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References

- Karppinen J, et al. Periradicular infiltration for sciatica. A randomized controlled trial. Spine 2001;26:1059-1067.
- Ghahreman, A, Ferch, R, Bogduk N. The efficacy of transforaminal injection of steroids for the treatment of lumbar radicular pain. Pain Med 2010; 11:1149-1168.
- Ghahreman A, Bogduk N. Predictors of a favorable response to transforaminal injection of steroids in patients with lumbar radicular pain due to disc herniation. Pain Med 2011; 12: 871–879
- Kennedy DJ, et al. Comparative effectiveness of lumbar transforaminal epidural steroid injections with particulate versus nonparticulate corticosteroids for lumbar radicular pain due to intervertebral disc herniation: A prospective, randomized, double-blind trial. Pain Med 2014;15:548-555.
- Smith CC, McCormick ZL Mattie R MacVicar J Et al. The Effectiveness of Lumbar Transforaminal Injection of Steroid for the Treatment of Radicular Pain: A Comprehensive Review of the Published Data, *Pain Medicine*. 2020 21(3), 472–487, https://doi.org/10.1093/pm/pnz197
- Lee JH, Shin KH, Park SJ, et al. Comparison of Clinical Efficacy Between Transforaminal and Interlaminar Epidural Injections in Lumbosacral Disc Herniation: A Systematic Review and Meta-Analysis. Pain Physician. 2018;21(5):433-448.
- Lee JH, Shin KH, Bahk SJ, et al. Comparison of clinical efficacy of transforaminal and caudal epidural steroid injection in lumbar and lumbosacral disc herniation: A systematic review and meta-analysis. Spine J. 2018;18(12):2343-2353. doi:10.1016/j.spinee.2018.06.720
- Chang-Chien GC, Knezevic NN, McCormick Z, Chu SK, Trescot AM, Candido KD. Transforaminal versus interlaminar approaches to epidural steroid injections: a systematic review of comparative studies for lumbosacral radicular pain. Pain Physician. 2014;17(4):E509-E524.
- Weinstein JN, Lurie JD, Tosteson TD, et al. Surgical versus nonoperative treatment for lumbar disc herniation: four-year results for the Spine Patient Outcomes Research Trial (SPORT). *Spine (Phila Pa 1976)*. 2008;33(25):2789-2800. doi:10.1097/BRS.0b013e3181bed8f4